



Europäisches
Patentamt

European
Patent Office

PCT / IB 0 3 / 0 0 5 3 9
Office européen
des brevets 12 FEB 2003

10/507189

Rec'd PCT/PTO 09 SEP 2004

REC'D 20 FEB 2003	
WIPO	PCT

Bescheinigung

Certificate

Attestation

Die angehefteten Unterlagen stimmen mit der ursprünglich eingereichten Fassung der auf dem nächsten Blatt bezeichneten europäischen Patentanmeldung überein.

The attached documents are exact copies of the European patent application described on the following page, as originally filed.

Les documents fixés à cette attestation sont conformes à la version initialement déposée de la demande de brevet européen spécifiée à la page suivante.

Patentanmeldung Nr. Patent application No. Demande de brevet n°

02075985.8

PRIORITY DOCUMENT
SUBMITTED OR TRANSMITTED IN
COMPLIANCE WITH
RULE 17.1(a) OR (b)

Der Präsident des Europäischen Patentamts;
Im Auftrag

For the President of the European Patent Office

Le Président de l'Office européen des brevets
p.o.

R C van Dijk

BEST AVAILABLE COPY



Anmeldung Nr:
Application no.: 02075985.8
Demande no:

Anmeldetag:
Date of filing: 13.03.02
Date de dépôt:

Anmelder/Applicant(s)/Demandeur(s):

Koninklijke Philips Electronics N.V.
Groenewoudseweg 1
5621 BA Eindhoven
PAYS-BAS

Bezeichnung der Erfindung/Title of the invention/Titre de l'invention:
(Falls die Bezeichnung der Erfindung nicht angegeben ist, siehe Beschreibung.
If no title is shown please refer to the description.
Si aucun titre n'est indiqué se referer à la description.)

Electrical circuit for igniting a discharge lamp, and electrical component module
and discharge lamp incorporating such an electrical circuit

In Anspruch genommene Priorität(en) / Priority(ies) claimed /Priorité(s)
revendiquée(s)

Staat/Tag/Aktenzeichen/State/Date/File no./Pays/Date/Numéro de dépôt:

Internationale Patentklassifikation/International Patent Classification/
Classification internationale des brevets:

H05B41/00

Am Anmeldetag benannte Vertragstaaten/Contracting states designated at date of
filing/Etats contractants désignées lors du dépôt:

AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR

Electrical circuit for igniting a discharge lamp, and electrical component module and discharge lamp incorporating such an electrical circuit

The invention relates to an electrical circuit for igniting a discharge lamp, comprising a voltage source, at least one first condenser electrically connected to the voltage source, a series chain, electrically connected in parallel to the first condenser, of at least one ignition and at least one first inductor, and a discharge lamp electrically connected in parallel to the ignition, which discharge lamp is provided with a discharge vessel. The invention also relates to an electrical component module for use in such an electrical circuit. The invention further relates to a discharge lamp incorporating such an electrical circuit.

The awareness of power conservation is becoming a significant factor both for purchasers as well as for lighting equipment manufacturers. The feature of a higher efficacy of a burner of High Pressure Sodium (HPS) lamps while retaining at least the same light intensity results in a lower use of consumed power, which creates clear benefit for the purchaser. A method known in the art to achieve a lower degree of consumed power is lowering the burner operating voltage, thus shifting the operation point of the lamp to lower power. However, applying said method is accompanied by several drawbacks. One of the drawbacks is that an implementation of lower burner voltage causes overstressing of a ballast, which is electrically connected with the lamp, as a result of an increase of the input current to the electrical circuit. An increase of the current results generally in a shortening of the lifetime of one or more electrical components, such as the ballast and the lamp that are part of the operating electrical circuit.

The invention has for its object to provide an electrical circuit with which at least a conventional light output of the discharge lamp can be generated at a relatively low power consumption without overstressing components forming part of the electrical circuit.

The invention provides for this purpose an electrical circuit of the type stated in the preamble, characterized in that the electrical circuit is provided with a second inductor which is electrically connected in series to the discharge vessel. By on the one hand applying a relatively low operating voltage over the electrical circuit, and on the other hand limiting the current - which increases as a result of the low operating voltage - by applying the second inductor, a light intensity of the light radiation generated by the discharge lamp which is substantially constant compared to the prior art can be obtained with a relatively low energy

consumption. A higher light efficiency of the discharge lamp will thus be obtained. One inference is that the lower energy consumption will result in less stress on the components incorporated in the electrical circuit, which will increase the lifespan of the components. The second inductor is particularly suitable for application in electrical circuits in which the resistance value of the first inductor (the ballast) is too low to substantially fully compensate the increase in the current resulting from the lower operating voltage. Owing to the substantially full compensation effect, wherein an increase in the current in the electrical circuit due to the decrease in the operating voltage is compensated by a (substantially equally large) lowering of the current by the second inductor, the current will be substantially equal to the current as according to a prior art electrical circuit. It will be apparent that the second inductor can also be replaced by another type of electrical component with a substantially comparable functionality, i.e. of reducing the current in the electrical circuit. Examples of such other components are a heat-sensitive resistor, such as a PTC-resistor, and a light-sensitive resistor.

The discharge lamp is preferably formed by a high-pressure discharge lamp, which in particular is provided with sodium. However, in addition to applying a discharge vessel in which a relatively high pressure prevails, it is also possible to apply a discharge vessel in which a relatively low pressure is present, such as for instance a low-pressure discharge lamp, which in particular is provided with sodium. Such a lamp is also designated as LPS lamp. In addition to sodium lamps it is also possible to apply High-Pressure Mercury Vapour Lamps in an electrical circuit according to the invention.

In a preferred embodiment the second inductor has an impedance of between 2 Ω and 10 Ω , preferably 4 Ω , when a discharge lamp of 250 Watts is applied. The optimal value of the second inductor depends among other things on the nature and technical properties of the components incorporated in the electrical circuit, including the power to be processed by the lamp.

In another preferred embodiment the discharge lamp is provided with a second condenser, which second condenser is connected in parallel to the second inductor and is connected in series to the discharge vessel. Test results show that the inclusion of a second condenser in the discharge lamp stimulates the ignition of the discharge vessel. In addition, the second condenser has a stabilizing effect on the electrical circuit in the operative mode, whereby optimal functioning of the electrical circuit can be achieved. The capacitance of the second condenser preferably lies between 5 nF and 15 nF, preferably 10 nF. As already stated in the foregoing, the optimal value of the capacitance of the second condenser depends

among other things on the nature and properties of other components incorporated in the electrical circuit.

The invention also provides an electrical component module for use in such an electrical circuit, in particular as an add-on device to the lamp. The electrical component module is preferably provided with a plug for releasable coupling of the component module to the first condenser, a socket for releasable coupling of the component module to the discharge lamp, and at least one electrical component electrically connected to the plug and the socket. After coupling of the component module to the condenser and the discharge lamp, the electrical component arranged in the component module is thus incorporated in the electrical circuit. Application of the component module in the electrical circuit gives the circuit a certain adaptive capability. A suitable component module can be built into the electrical circuit subject to the set requirements for the electrical circuit. Owing to the releasable coupling between the component module and other electrical components it is possible to replace the component module in simple and not very time-consuming manner during disfunction of one or more of the (electrical) components forming part of the component module. The presence of a component module therefore increases the accessibility of the electrical components arranged in the component module. Another advantage is that existing fittings with built-in choke can be modified in relatively simple manner such that they meet the requirements of an electrical circuit for igniting a discharge lamp according to the present invention. The electrical component serves particularly to reduce the current running through the electrical circuit.

In a preferred embodiment the electrical component is formed by the second inductor. As already stated above, another type of electrical component with a substantially comparable functionality, i.e. of reducing the current, can also be applied instead of the second inductor. An example of such another type of component is for instance a thermoresistor, preferably a PTC-resistor, or a light-sensitive resistor. In a particular preferred embodiment the electrical component is formed by the second inductor and a second condenser electrically connected in parallel to the second inductor.

The invention further provides a discharge lamp for use in an electrical circuit as described above. The discharge lamp is preferably provided with the second inductor which is electrically connected in series to the discharge vessel. Because of the inductor reducing the current, incorporation of the discharge lamp in the electrical circuit will - at a relatively low operating voltage - generally result in a relatively low energy consumption at an at least practically constant light output. A lower current in the electrical circuit will

generally result in a lower stress on the components incorporated in the electrical circuit, which enhances the lifespan of the components.

5 The invention will be elucidated on the basis of non-limitative embodiments shown in the following figures. Herein:

Fig. 1 shows an electrical circuit diagram corresponding with a first preferred embodiment of the invention,

10 Fig. 2 shows an electrical circuit diagram corresponding with a second preferred embodiment of the invention, and

Fig. 3 shows a discharge lamp provided with an electrical component module according to the invention.

15 Fig. 1 shows an electrical circuit diagram 1 corresponding with a first preferred embodiment of the invention. Diagram 1 comprises an alternating voltage source 2, a condenser 3 electrically connected to the alternating voltage source 2, a first inductor 4 and an igniter 5. First inductor 4 and igniter 5 form a series chain 6, which series chain 6 is electrically connected in parallel to the alternating voltage source 2 relative to condenser 3.

20 Diagram 1 is also provided with a discharge lamp 7 which is included in the diagram in parallel connection to igniter 5. Discharge lamp 7 is provided with a lamp cap 8, a discharge vessel 9 electrically connected to lamp cap 8 and a second inductor 10 electrically connected in series to discharge vessel 9. For protection purposes the discharge vessel 9 and second inductor 10 are mounted in an outer globe 11 connected to lamp cap 8. Advantages of the

25 present preferred embodiment have already been described above.

Fig. 2 shows an electrical circuit diagram 12 corresponding to a second preferred embodiment of the invention. Diagram 12 is practically identical to the electrical circuit diagram shown in Fig. 1, with the difference that a different preferred embodiment of a discharge lamp 13 is included in diagram 12. Discharge lamp 13 comprises a lamp cap 14,

30 a discharge vessel 15 electrically connected to lamp cap 14 and a parallel circuit of a second condenser 16 and a second inductor 17 electrically connected in series to discharge vessel 15. The presence of the second condenser 16 stimulates the ignition of discharge vessel 15. In addition, condenser 16 has in particular a stabilizing effect on electrical circuit 12.

Fig. 3 shows a discharge lamp 20 provided with an electrical component module 21 according to the invention. Discharge lamp 20 is provided with a lamp cap 22, a switching segment 23 connected to lamp cap 22 and an outer globe 24 connected to switching segment 23. Component module 21 is provided with a socket 25, which socket 25 is adapted for releasable electrical coupling to a plug 26 forming part of switching segment 23. Incorporated in component module 21 is a parallel circuit of a condenser 27 and an inductor 28, which parallel circuit is electrically connected to socket 25. In the outer globe is arranged a discharge vessel 29 which on one side is electrically connected to lamp cap 22 and on an opposite side is also electrically connected to lamp cap 22 via component module 21.

In the case of malfunction of condenser 27 and/or inductor 28 the component module 21 can be disconnected from switching segment 23 and then replaced by a properly functioning component module. The coupling of component module 21 to switching segment 23 results in a substantially uninterrupted circuit. The configuration shown in Fig. 3 is thus constructed such that the parallel circuit is connected in series to discharge vessel 29. In addition to the shown component module 21, component modules can also be envisaged which are provided with other electrical components and/or a different relative orientation of the components. It will be apparent that a component module can also be positioned between a discharge lamp and an electrical circuit, whereby the (existing) discharge lamps and electrical circuits do not have to be replaced by new constructions. Positioning of the adaptive component module between the discharge lamp and the circuit is all that is sufficient to create an electrical circuit according to the invention.

CLAIMS:

1. Electrical circuit for igniting a discharge lamp, comprising:
 - a voltage source,
 - at least one first condenser electrically connected to the voltage source,
 - a series chain, electrically connected in parallel to the first condenser, of at
- 5 least one ignition and at least one first inductor, and
 - a discharge lamp electrically connected in parallel to the ignition, which
- discharge lamp is provided with a discharge vessel, characterized in that the electrical circuit is provided with a second inductor which is electrically connected in series to the discharge vessel.
- 10
2. Electrical circuit as claimed in claim 1, characterized in that the discharge lamp is formed by a high-pressure discharge lamp.
3. Electrical circuit as claimed in either of the foregoing claims, characterized in
- 15 that the discharge vessel is provided with sodium.
4. Electrical circuit as claimed in any of the foregoing claims, characterized in that the second inductor has an impedance of between 2 Ω and 10 Ω , preferably 4 Ω
- 20 5. Electrical circuit as claimed in any of the foregoing claims, characterized in that the second inductor is incorporated in the discharge lamp.
6. Electrical circuit as claimed in any of the foregoing claims, characterized in that the electrical circuit is provided with a second condenser, which second condenser is
- 25 electrically connected in parallel relative to the second inductor and in series to the discharge vessel.
7. Electrical circuit as claimed in any of the foregoing claims, characterized in that the capacitance of the second condenser lies between 5 nF and 15 nF, preferably 10 nF.

8. Electrical component module for use in an electrical circuit as claimed in any of the claims 1-7.

- 5 9. Electrical component module as claimed in claim 8, characterized in that the component module is provided with a plug for releasable coupling of the component module to the first condenser, a socket for releasable coupling of the component module to the discharge lamp, and at least one electrical component electrically connected to the plug and the socket.

10

10. Electrical component module as claimed in claim 9, characterized in that the electrical component is formed by the second inductor.

11. Electrical component module as claimed in either of the claims 9-10,
15 characterized in that the electrical component is formed by the second inductor and a second condenser electrically connected in parallel to the second inductor.

12. Discharge lamp for use in an electrical circuit as claimed in any of the claims 1-7.

20

13. Discharge lamp as claimed in claim 12, characterized in that the second inductor is incorporated in the discharge lamp.

ABSTRACT:

The invention relates to an electrical circuit for igniting a discharge lamp, comprising a voltage source, at least one first condenser electrically connected to the voltage source, a series chain, electrically connected in parallel to the first condenser, of at least one ignition and at least one first inductor, and a discharge lamp electrically connected in parallel to the ignition, which discharge lamp is provided with a discharge vessel. The invention also relates to an electrical component module for use in such an electrical circuit. The invention further relates to a discharge lamp for use in such an electrical circuit.

Fig. 1

1/2

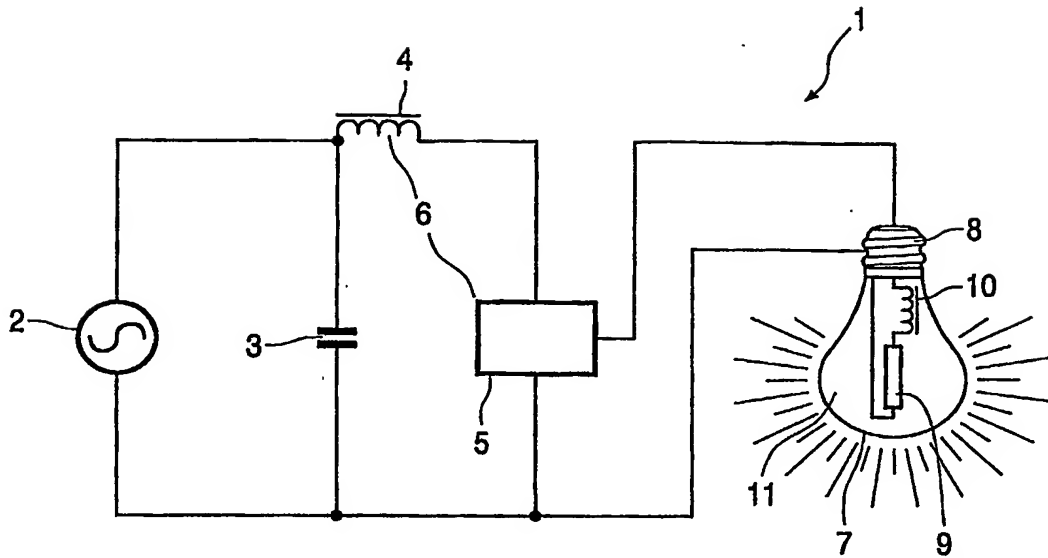


FIG. 1

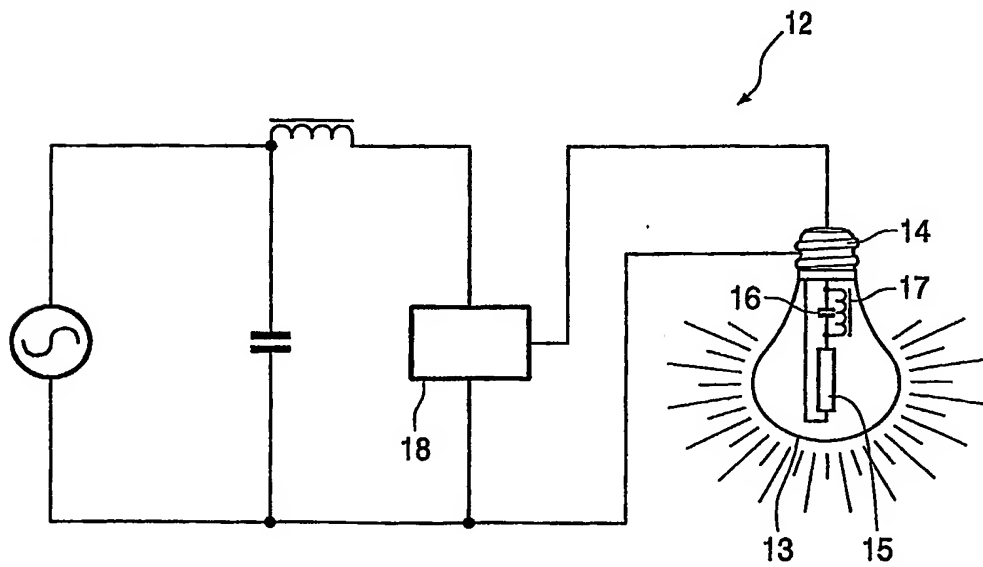


FIG. 2

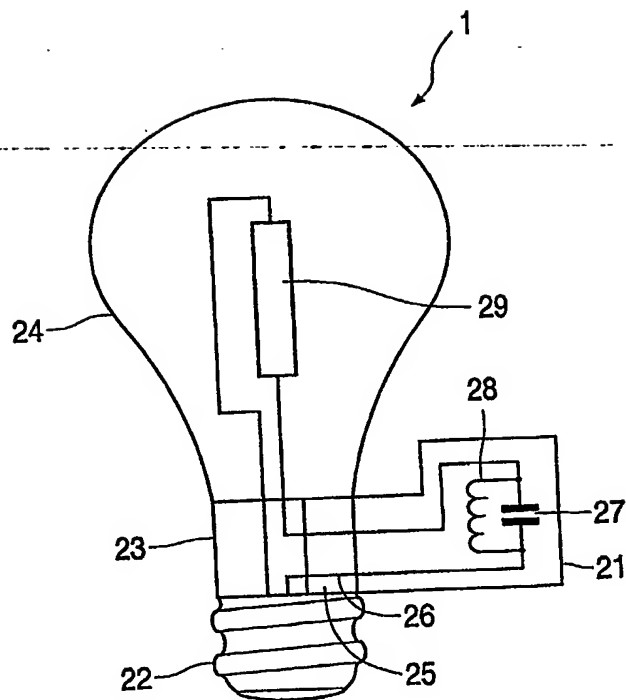


FIG. 3

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☒ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☒ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☒ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.